

## U.G. 2<sup>nd</sup> Semester

### Paper: BOT201C (Core) Vascular Cryptogams and Gymnosperm

Credits: 5 = 3+0+2 (48 Lectures)

#### Theory: 48 Lectures

##### Pteridophytes: Lectures-24

**Unit-1:** Characteristics features and life cycle of Pteridophytes; Apogamy and Apospory,

**Unit-2:** Classification, habit and habitat, stelar structure, origin and evolution of pteridophytes, heterospory and origin of seed habit.

**Unit-3** Comparative account of morphology, anatomy and reproduction of *Psilotum*, *Lycopodium*, *Selaginella*, *Equisetum*, *Marsilea* and *Pteris*.

##### Gymnosperms: Lectures-24

**Unit-4:** Classification of gymnosperms with special reference to Sporne's classification (1965) upto class with characters and examples; significance of gymnosperms; resemblances and differences between gymnosperms, pteridophytes and angiosperms.

**Unit-5:** Comparative account of morphology, anatomy and reproduction of *Cycas*, *Pinus*, *Ginkgo* and *Gnetum*.

**Unit-6:** Fossils: Definition, types, nomenclature of fossils and conditions for fossilization; modes of preservation (J.M.Schoff 1975); geological time scale and major events of plant life through geological ages. General account of Psilophytales (*Rhynia*), Lepidodendrales (*Lepidodendron*) Sphenophyllales (*Sphenophyllum*) and Bennetitales (*Williamsonia*).

#### Practicals: (2 Credits)

##### Pteridophyte

- Study of habit, vegetative thallus organization and reproductive structures of the following taxa through specimens, temporary mounts and permanent slides or fresh material whichever is available.
- Pteridophytes : *Lycopodium*, *Selaginella*, *Equisetum*, *Marsilea* and *Pteris*.

##### Gymnosperm:

- Study of habit, vegetative thallus organization and reproductive structures of the following taxa through specimens, temporary mounts and permanent slides or fresh material whichever is available.
- Gymnosperms - *Cycas*, *Pinus*, *Ginkgo* and *Gnetum*.
- Fossil forms using permanent slides /photographs –*Rhynia*, *Lepidodendron*, *Sphenophyllum* and *Williamsonia*.

#### Suggested readings:

##### Pteridophyta:

- Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.

- Pandey, B. P. 2006. College Botany, Vol. II: Pteridophyta, Gymnosperms and Paleobotany. S. Chand & Company Ltd, New Delhi.
- Vasishtha, P.C. (2006) Botany for Degree Students: Vol.IV- Pteridophyta

#### **Gymnosperm:**

- Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
- Chamberlain, C.J.: Gymnosperms: Structure and evolution, (CBS publishers and distributors)
- Karkar, R.K. and Karkar, R.: The Gymnosperms
- Sporne, K.R. (1961): The Morphology of Gymnosperms, (Hutchinson University Library, London)
- Stewart, W.N. & Rothwell, G.W.: Paleobotany and evolution of plants, (Cambridge University Press)
- Vashishta, P.C. (1990): Gymnosperm, (S.C. Chand)

**Paper: BOT 202C (Core)**  
**Advanced Morphology & Plant Anatomy**  
**Credits: 5=3+0+2 (48 Lectures)**

#### **Theory: 48 Lectures**

#### **Advanced morphology: Lectures-15**

##### **Unit-1:**

Origin and evolution of angiosperms, inflorescence and angiospermic flowers, concept of flower as modified determinate shoot, special types of fruits – Spurious fruits (*Dillenia*); Aggregate fruits (*Annona*, *Michelia*, *Catharanthus*, *Polyalthia*); Multiple fruits (*Ananas*, *Artocarpus*). Homology and analogy of plant parts. Origin and evolution of angiosperms

##### **Unit-2:**

Theories and the development of leaf, stamen and carpel (Phyllode theory, Telome theory, Carpel polymorphism, Inferior ovary), role of morphology in plant classification.

#### **Plant Anatomy: Lectures-33**

##### **Unit-3:**

Structure and function of cell wall and plasma-membrane, extra cell wall materials - lignin, cutin, suberin, callose, wax.

##### **Unit-4: Tissues and tissue system:**

Theories of structural organisation of root apex and shoot apex, Different types of tissue and tissue systems and their functions, mechanical tissue.

##### **Unit-5: Leaf, stem and root anatomy:**

Leaf anatomy, anatomy of primary monocot and dicot stems/roots, anomalous structure in the primary body of stem.

##### **Unit-6: Secondary growth:**

Secondary and anomalous secondary growth in monocot and dicot stems with special reference to (*Bignonia*, *Amaranthus*, *Tecoma* and *Dracaena*.)

## **Practicals: (2 Credits)**

### **Advanced morphology :**

- Study of special types of inflorescences – Cyathium, Hypanthodium, Verticillaster.
- Study of special types of fruits – *Dillenia*; *Annona* , *Michelia*, *Catharanthus*, *Polyalthia*, *Ananas*, *Artocarpus* .

### **Anatomy :**

- Study of anatomical details of the following through permanent slides/temporary stain mounts/ macerations/ specimens with the help of suitable examples-stomatal types, trichomes, xylem and phloem elements.
- Study of primary structures of monocot and dicot root and stem.
- Study of anomalous structure in the primary body of stem - *Bougainvillea*, *Nyctanthes* and *Oryza*.
- Study of anomalous secondary growth in *Bignonia*, *Amaranthus*, *Tecoma* and *Dracaena*.

**\*Practicals should be supported by practical record/slides and specimens**

### **Suggested readings:**

#### **Advanced morphology:**

- Mitra J.N. (1988), An introduction to systematic Botany and Ecology, The world press private Ltd., Calcutta
- Eames, A J. (1983), Morphology of Vascular plants, Standard University press.

#### **Plant anatomy:**

- Abraham, F. (1982). Plant anatomy 3 editions, Pergaon Press, Oxford.
- Roy P (2010) Plant Anatomy, New Central Book Agency.
- Pandey B.P.(2001). Plant Anatomy. S. Chand and Company Ltd., New Delhi.
- Cutter, E. G. (1971). Plant Anatomy – Part I & II, Cell and Tissues. Edward Arnold, London.
- Easu, K. (1996). Anatomy of Seed Plants. First wiley Reprint, New Delhi.
- Fahn, A. (1985). Plant anatomy, Pergaon Press, Headington Hill Hall, Oxford.

## **Paper Code – BOT203G (General Elective)**

### **Plant Diversity and Plant Taxonomy**

**Credits: 4=3+0+1 (48 Lectures)**

#### **Theory: 48 Lectures**

##### **Unit-1: Algae (Lectures-08)**

General account, thallus organization, distribution, classification (F.E. Fritch, 1935), reproduction, Life cycle patterns and economic importance of algae

##### **Unit-2: Fungi and Lichen (Lectures- 08)**

General characteristics, Classification (Ainsworth), range of thallus organization, nutrition, reproduction, Economic importance of fungi.

**Lichen;** General account, habitat and thallus structure, economic importance.

##### **Unit-3: Bryophytes (Lectures-06)**

Characteristic features, classification (Proskeur, 1965), reproduction, alternation of generation, origin and evolution of bryophytes, economic importance.

#### **Unit-4: Pteridophytes (Lectures-08)**

General characteristics, Classification by Sporne(1975), life cycle patterns, Apogamy and Apospory, Origin and evolution of pteridophytes, Heterospory and origin of seed habit.

#### **Unit-5: Gymnosperms (Lectures-08)**

Introduction, Classification by Sporne (1975), distribution, economic importance; Comparative account of morphology, anatomy and reproduction of *Cycas*, *Pinus*, *Ginkgo* and *Gnetum*.

#### **Unit-6: Angiosperm (Lectures-10)**

Aims and objectives, binomial nomenclature, General account of system of classification with special reference to Bentham and Hooker's system. General characters, distinguishing characters and economic importance of the following families- Magnoliaceae, Brassicaceae, Fabaceae, Solanaceae, Lamiaceae, Verbenaceae, Asteraceae, Poaceae, Orchidaceae.

#### **Practicals: Plant Diversity (1 Credit)**

**Algae:** Study of vegetative and reproductive structures of the following algal types: *Anabaena*, *Chara*, *Batrachospermum*.

**Fungi:** Study of vegetative and reproductive structures of the following taxa: *Mucor*, *Penicillium*; *Puccinia*.

**Lichen:** Thallus morphology of Crustose, Foliose and Fruticose types.

**Bryophytes:** Study of the gametophytic and sporophytic structures of the following genera and their identification: *Marchantia*, *Anthoceros*, and *Funaria*.

**Pteridophytes,** Study of the sporophytic structures of the following genera by preparation of temporary and permanent slides: *Lycopodium*, *Selaginella* and *Pteris*

**Gymnosperms:** Study of habit, vegetative and reproductive structures of the following taxa through specimens, temporary mounts and permanent slides or fresh material whichever is available: *Cycas*, *Pinus* and *Gnetum*

**Angiosperm:** Description and identification (up to genus) of angiospermic specimens of locally available plants belonging to any three families included in the theory syllabus.

**\*Practicals should be supported by practical record & Slides/ specimens / herbariums ( at least 10).**

#### **Suggested Readings:**

##### **Algae:**

- Pandey, B.P (2010) : Botany for Degree students
- Sharma. O.P(2017) : Algae
- Singh, S.K. & S. Srivastava (2008): A Text Book of Algae.
- Vasishtha, B.R. - (1974) Botany for Degree Students – Vol-I Algae.

##### **Fungi:**

- Bold, H.C., Alexopoulos, C.G. and Delevoryas, T.: Morphology of plants and Fungi, (Harper and Row Publishers)
- Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, Macmillan Publishers India Ltd.
- Mitra.J.N., Mitra. D., Chowdhuri, S.K.;Studies in Botany(Vol. one)(2018)Moulik Library 18-B
- Sharma, O.P., (1999) Text book of fungi. Tata McGraw Hill publishing Company Ltd. New Delhi.

**Lichen**

- Misra, A. & R.P. Agarwal : Lichens – A Preliminary Text.

**Bryophytes**

- Parihar, N.S : An Introduction to Embryophyta.
- Puri, P.: Bryophytes.
- Rashid, A.(1998): An Introduction to Bryophyta.
- Vasishtha, B.R. - (1974) Botany for Degree Students: Vol. III - Bryophyta

**Pteridophytes :**

- Rashid, A.(1999). Introduction to Pteridophyta.
- Singh, S.K.(2008). Pteridophyta.
- Vasishtha, P.C. (2006) Botany for Degree Students: Vol. IV- Pteridophyta

**Gymnosperms :**

- Bhatnagar, S.P. & A. Moitra : Gymnosperms.
- Chamberlain, C.J(2009). Gymnosperm, Structure and Evolution.
- Johri B. & Biswas .(1984) Gymnosperms.
- Vasishtha, P.C(2010) : Botany for Degree Students :Gymnosperm.

**Angiosperm:**

- George, H.M. Lawrence (2012), Taxonomy of Vascular Plants.
- Mitra.J.N., Mitra. D., Chowdhuri, S.K (2018). Studies in Botany(Vol. one) Moulik Library 18-B
- Singh G (2011), Plant Systematics - Theory and Practice.
- Vasishtha, P.C., Taxonomy of Angiosperms.